



ROBOTICS UPDATE

"Providing network-integrated robotic solutions for C4ISR applications."

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U.S. Navy Shows High-Level Interest In Robotic Systems

Several high-ranking officials visited the Center in May, including the Honorable Hansford T. Johnson, Acting Secretary of the Navy (SECNAV), and Admiral Vern Clark, Chief of Naval Operations (CNO). Tremendous interest was expressed in several of the 19 projects now underway within the Robotic Systems Branch, with focused attention on recent support to Navy SEALs and their associated Explosive Ordnance Disposal (EOD) units deployed in Iraq and Afghanistan.

2371 Branch Head. The following week the Honorable Hansford T. Johnson, Acting Secretary of the Navy, toured the Center, receiving an unmanned systems briefing from Bart Everett, 237's Associate Division Head for Robotics, followed by a demonstration of various man-portable robots from the Robotic Systems Pool.

other interested parties on Operation Enduring Freedom: Special Operations in Afghanistan. Admiral Calland and his staff were presented Knowledge Web and FORCEnet briefings by various Center personnel, with a focus on intelligence, surveillance and reconnaissance (ISR) information supporting special operations. An important part of the latter included live demonstrations of unmanned systems for surface, ground, air, and underwater.

In July, SSC San Diego's Multi-robot Operator Control Unit (MOCU) was selected by the SPARTAN Advanced Concept Technology Demonstration (ACTD) as the command and control system for its Unmanned Surface Vehicles (USVs). MOCU is a tactical derivative of the MDARS Multiple Resource Host Architecture that can control a variety of unmanned systems operating on air, land, or sea. SSC San Diego will team with SSC Charleston to incorporate their Integrated Charting Engine (ICE) with MOCU to provide an Electronic Chart Display and Information System (ECDIS), in lieu of the *a priori* overhead imagery and terrain database information currently used to plan routes and track the motion of land-based UGVs and UAVs.



ADM Clark (c), CNO, observes URBOT demo by Robin Laird (r) and EM1 Thomas Hoover (l).



SECNAV Johnson (l) receives unmanned systems briefing by Bart Everett (c), followed by man-portable robot demonstration.



RADM Calland, NSWC (l), RADM Ken Slaght, SPAWAR Commander (c), and Dr. Bob Kolb, SSC San Diego Executive Director (r).

The CNO, and several members of his staff visited on May 15 and were briefed on a number of key Center programs, then given an unmanned systems demonstration by Robin Laird,

Rear Admiral Albert "Bert" Calland, Commander, Naval Special Warfare Command (NSWC), visited on May 28 and briefed senior management and

Since early 2003, the Robotic Systems Branch has provided technical support and consultation to Mr. Keith LeBouef of Naval Special Warfare Group 3 (NSWG3), Special Boat Unit.



SSC San Diego's USV supports test and development of MOCU for SPARTAN ACTD.

SSC San Diego Robots Featured on Local News

During the last week of July, SSC San Diego hosted Rod Luck and the KUSI Morning News. On July 31, as Mr. Luck reported the day's sports news, the Robotic Systems Branch demonstrated several unmanned systems for the local TV audience, featuring the MDARS Exterior and Interior robots, the MPRS URBOT, several robots from the Robot Sys-



KUSI's Rod Luck, CAPT Flynn, and Robotic Systems Branch prepare robots for broadcast.

tems Pool, and an interactive interview with an Inuktun VGTV (fondly referred to as "Bob" by the local news personality).

Other live interviews included Captain Tim Flynn, Robin Laird, Aaron Burmeister, LCDR John Tucker, and EM1 Tom Hoover (SSC San Diego), as well as Kelly Grant (CSC) and Thomas Denewiler (SAIC).



An Inuktun VGTV robot featured during the live news broadcast.

SSC San Diego Staffs Unmanned Systems Reserve Unit

From armed Predator UAVs patrolling the desert skies, to small PackBot, Talon, URBOT, and Matilda UGVs exploring caves and compounds, unmanned systems are fast becoming an integral part of tactical missions in Afghanistan and Iraq. Tremendous amounts of funding and effort have been allocated by DoD to develop and apply robotic technology, which subsequently is evolving in an explosive fashion. The effective introduction of these new and very promising capabilities into operational units, however, requires experienced personnel with appropriate technical and managerial skills. Due to the ever-expanding rate of development and rising expectations, demand for these uniquely qualified individuals is rapidly outpacing supply.

To address this deficiency, a recently created team of highly skilled Naval Reserve personnel now provides critical operational and technical support to the Robotics Systems Branch. This

“virtual reserve unit” pulls together highly qualified skilled personnel from the private sector and enables them to directly support the unmanned systems missions. These individuals come from a wide variety of civilian backgrounds, and many are trained naval engineers (Engineering Duty Officers) with advanced degrees in electrical, mechanical, and computer engineering.



Crisis response training at CRASAR field exercise in OK.

The Reserve Unit has also played an active role in implementing, maintaining, and promoting the Robotic Systems Pool. With their military/civilian backgrounds, reserves provide

a natural interface between the end-users and the research and engineering teams that strive to improve asset functionality through a spiral development process. Upgrades, system checkouts, and preventive maintenance tasks related to keeping the systems in good working order are all part of the daily routine.



EM1 Tom Hoover prepares a Talon for shipment.

Providing formal operator training for the user has been a primary responsibility of the reserve unit. A number of training sessions have been given to Navy EOD, search and rescue, and police personnel. The training nominally takes two days,

allowing users to become familiar with operating the various robotic platforms and their associated controllers.



EOD team examines the chemical/radiological sensor payload on an URBOT.

Along with many other agencies, the SSC-SD reserve team is also working to help define the role of small robots in first-response situations, and actively participating in organizations and conferences that specifically address robotic-assisted crisis response. Reserve personnel stand ready as uniformed response teams, able to deploy on short notice with the robotic assets whenever and wherever needed.

MDARS Team Supports FPED IV and Force Protection Expo

The fourth biennial DoD Force Protection Equipment Demonstration (FPED IV) was conducted in May at Marine Corps Base, Quantico, Virginia, with over 10,000 visitors. Co-sponsored by the Army's Product Manager, Physical Security Equipment (PM-PSE), the Transportation Security Administration (TSA), and the Technical Support Working Group (TSWG), the event demonstrated current and future force protection capabilities and solutions, uniting government users and industry leaders with equipment manufacturers.

Highlighting the many operational demonstrations once again was PM-PSE's Mobile Detection Assessment Response System-Exterior (MDARS-E), which provides autonomous robotic patrol units for physical security and automated inventory at DoD bases and storage sites. SSC San Diego serves as Technical Director, and also as developer of the Multiple Resource Host Architecture (MRHA) command and control software, which al-

lows a security guard to oversee up to 255 unmanned ground vehicles, unattended sensors, and semi-autonomous defensive munitions. The program is currently in the System Development and Demonstration (SDD) acquisition phase, with General Dynamics Robotics Systems (GDRS) serving as systems integrator.



The newly unveiled MDARS-E SDD platform at FPED IV.

SSC San Diego and GDRS unveiled the latest SDD platforms for their first public showing, demonstrating autonomous navigation, obstacle avoidance, and intruder detection capabilities while traversing the flight line used by Marine Corps One (the presidential helicopter).

In a joint development effort with the U.S. Air Force, the MDARS SDD robot is also the surveillance platform for the Remote Detection, Challenge, and Response (REDCAR) initiative managed by the Air Force's Force Protection Battlelab (FPB), Lackland AFB, Texas. REDCAR is a network of robotic platforms integrated with existing security sensors and the Integrated Base Defense Security System. The FPB is conducting the REDCAR initiative in partnership with the Air Force Research Lab (AFRL), Tyndall AFB, Florida. AFRL is developing a companion engagement platform (pictured below), which is based on the Polaris ATV chassis.



REDCAR engagement platform based on the Polaris ATV.

Both the surveillance and engagement platforms were demonstrated at FPB's Robotics Expo at San Antonio in August. SSC San Diego and AFRL are developing Joint Architecture for Unmanned Systems (JAUS) compliant software, which is a component-based message-passing architecture specifying data formats and methods of communication among computing nodes.

Army and Air Force users are also very interested in the MDARS UGV/UAV Marsupial Concepts employing the 29-inch iStar vertical-takeoff ducted-fan air vehicle, and smaller backpackable UGVs for both surveillance and response missions.

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